our senses is continually being altered and changed in form, or some other of its essential or contingent properties; but never ultimately destroyed by annihilation. For all those changes which take place in the sensible qualities of bodies, result from the action of one species of matter upon another. Thus, the ascension of water from the earth in the form of vapour, by means of the sun's influence and other atmospheric causes; the conversion of certain elements of air, moisture, and earth into the structures of plants by the peculiar organization of these bodies; the formation of coal and other species of bitumen under the surface of the earth by the changes which vegetables undergo when deprived of their vital principles, and they have become subservient to other agencies; and the liquefaction of metals by means of fire;—prove that the operations of chemistry are concerned in the greater part of the secret processes of nature as palpably as of those which display the most useful and agreeable results of the art of man. But chemistry, like nearly the whole of the other subjects of human skill and industry, was practised as an art long before any knowledge of its principles was attained as a science. And our inquiries are vain when we search to discover the inventor of the first plough, the baker of the first bread, the potter who first turned a bowl on the wheel, or the wright who hollowed out the first canoe. Men used their hands for the purpose of supplying their wants long before they were acquainted with the laws of mechanics; and prompted by the power of instinct or invention, while the example of other animals favoured their imitative faculties, they exercised many of the useful arts without knowing on what principles they were enabled to attain their ends. Yet were these ends attained at a period very far anterior to that in which they had any methods of recording their acquirements; and more remote too, we should suppose, than that to which the immense grasp of human tradition can extend.

But what has all this to do with a discourse upon somatology? Much every way. Unless men in those remote ages had studied the essential and contingent properties of bodies, the arts of metallurgy, dyeing, and pottery, which are mentioned in the earliest literary records we possess, would not have arrived at the excellence they had reached; and but very few people have been found so barbarous as not to present some specimens of their skill in productions allied to those arts. Nor was their genius confined to one quadrant in the circle of sciences; they traversed its circumference, else whence those difficult and abstruse chemical processes that have immortalized Egyptian invention and Mexican skill? The grape, eaten in its unfermented juice, is charged with no inebriating qualities, but its expressed juice is rendered intoxicating; and the vine is never mentioned in times of remote antiquity except as the fruit which "maketh glad the heart of man." Osiris or Bacchus traversed the globe for the purpose of teaching all nations the cultivation and use of the vine. But to illustrate our allusion to Egyptian invention. The conversion of rough ore into a finely polished metal, the application of antiseptics in the art of embalming the dead, the whole art and mystery of medicinal chemistry as practised by the corporations of mummy-makers, the manufacture of colours and of stained glass, demonstrate a state of civilization highly conducive to the comforts of man; for the Egyptians were without doubt the first people of antiquity who excelled in all the arts which are purely scientific. As it was among the nations of antiquity, so it is with us; some men record the observations that fall within their reach, others by experiments arrive at results highly conducive to the comfort of society; upon inquiry we find that the material world, and the application of its treasures to the ease or splendour of human existence, form the grand emporium in which every man, as he may be prompted by inclination or talents, is at liberty to exercise his talents and push forward his invention to convert to public advantage and private emolument the inexplicable resources which on all hands solicit the unremitting application of his patient, laborious industry.

Mechanical means may be employed to reduce masses of hard substances to dust; the agency of fire will convert water into steam; nay, even gold, which in the crucible becomes liquid, can by intense heat be dissipated into vapour and again collected into its original mass without losing in weight by these most extraordinary changes. In this example, the identity of the substance we call gold is the most unanswerable proof of the indestructibility of matter. Our experiments must always be limited to our apparatus. But had we the means of erecting apparatus sufficiently capacious, we might let off in vapour all the water in Loch Ness, or reduce to fine sand all the Grampian Hills. Yet the vapour, though by the laws of repulsion it was no longer water, would still exist, and the *debris* of those primitive rocks would be held down to the surface of the earth by virtue of gravitation.

Thus we see that whether we assume the veriest atom of aeriform, liquified, or gross and hard substances, as the representative of body and matter, all that we can do with that atom but enables us the more accurately to define its properties, and expatiate upon the transformations through which it can be pushed by human ingenuity. Let the gold-beater hammer his leaves of gold so thin that eighteen hundred of them would not be thicker than a leaf of this book, still it is gold! Let the chemist with a single grain of vitriol or carmine tinge a gallon of water, every particle of his vitriol, every atom of his carmine, is diffused in the water, every drop of which imbibes the die. Let the manufacturer of gas convert the pith of coal into an invisible aeriform fluid, its permanency is obvious by the light it affords, and its soot, which is generated by the flame, attests the indestructible quality of matter. Let the grave absorb the noble structures that once formed the frail tenements of immortal spirits, still the ultimate particles of kindred matter will serve again for new combinations, as inexplicable to our gross senses, and incomprehensible to our finite understandings, as the solution of the great problem which forms the basis alike of revelation and of all human knowledge; "In the beginning God created the heaven and the earth."

In that heaven and this earth we behold the greatness of Almighty Power, the infinite wisdom and unsearchable goodness of our common Parent. With how much humility, then, doth it become us to talk about even the properties of matter. Some of these properties are essential to its existence; others are contingent to that existence, and depend upon various changes to which every created substance is liable, by reason of the invariable laws of nature, or the transformations to which it may be subjected by the ingenuity of man. But in any and in all situations matter is body, and body is matter; yet in geometrical language the term body means a solid, which in natural philosophy is defined a portion of space or of matter limited in magnitude on all sides. Habit has fixed upon our minds a notion of space that supersedes definition. Body—that is, a solid—considered in itself, may be viewed as indifferent to motion or rest, but capable of any sort of motion, straight or curvilinear, speedy or slow, and of all sorts of figure, square, round, and oval, or of any forms we may choose to impress upon it externally. Body then is matter, of which we know nothing except by its properties; and our notions of these properties are all simple ideas, which we cannot divide, even in imagination, so perfectly uniform are they, so devoid of parts. But when we proceed to analyse these ideas, their simplicity vanishes—each forms a nucleus of an extensive aggregate; the fecundity of the whole exceeds our furthest conceptions. For, how many associations may we link with the terms extension and figure? and yet these are but two out of a dozen of properties that we might enumerate as essential or contingent to all matter, *solid* or *fluid*.

Moreover, all bodies have secondary properties, which may be classed as hard, soft, and elastic. A *hard body* does not yield without breaking to any stroke or percussion, but retains its figure unaltered, unless the blow or percussion be so great as to overcome the cohesion of the parts, and produce fracture or pulverization. A *soft body* is that which yields, in all its parts, to any stroke or percussion, or even impression, without ability of restoring itself to its original form. An *elastic body* is that whose parts yield to any stroke, but immediately begin to restore themselves, and the body ultimately assumes its previous figure. There are no bodies, however, with which we are acquainted, that are perfectly hard, soft, or elastic; but all bodies—that is to say, all matter, or created substances—possess some one of these properties in a greater or less degree.

The popular distinction of matter into solids and fluids requires to be noticed in this place. Philosophers define a solid as that in which the attractive power of the particles of which it is composed exceed their repulsive power, and consequently they are not easily moved among themselves: the body therefore retains any figure with which it may be impressed. A fluid, on the other hand, is that in which the attractive and repulsive power of the particles are in exact equilibrio, or in a state of balanced rest amongst themselves, and the body therefore yields to the slightest impression, and, like the elastic body, easily and readily resumes its primitive form. A fluid is any thing which cannot be grasped by the hand like a piece of marble or the branch of a tree.

Among the mechanics of natural history, one of the most delicate examples we have to offer in illustration of a fluid is the following:—

Upon the surface of smooth water, you will see the most active little insects run their daily course without sinking, or even wetting their feet. Examine with a magnifying glass the track which one of these has run on the surface of the water, and round each foot a pit will be observed resembling the indentation which a baker makes in kneading dough. If the feet of these insects be examined with a microscope, they will present five or six spreading hairs, ranged as the rays in which we draw a star. When on the water, each fibre is surrounded by a pit, much broader than the fibre; the quantity of water displaced in the pits is exactly equal to the weight of the insect, which in its rapid course upon the bosom of an Alpine spring leaves the most beautiful tracery behind it that can be imagined, and analogous to what may be termed the mechanical undulations which we trace in the wake of a steam-vessel; so also a well-polished needle will displace its weight of water and swim, because its surface is so smooth that the water does not adhere to it. The brushy feet of the insects are in physical, but not in mathematical contact with the water, and, by repelling it, depress so much of it that they are supported. But upon luke-warm water or a glass of mixed ordinary distilled spirit and water, none of the aquatic insects can run; on these they will sink to their belly. Into the specific law of corpuscular action, which obtains in this case, our inquiry does not enter. We have shewn that a fluid is matter which yields to the slightest impression, and we might further confirm our example by reference to the whale and the minnow; the fry of the minnow, not one-tenth of an inch long, and even wonderfully smaller animals which the microscope exhibits to our gaze, swim about with perfect freedom in a globule of water. The particles of fluid bodies are spherical, and their forces are more directed to their centres than to their surfaces, by which means motion is allowed freely when any force is applied from without: whereas when these particles are at rest all their parts are in equilibrium, in respect of each other. The pressure however of incumbent bodies, and containing vessels, always produces some deviation from the perfect equilibrium. It may be that in fluids of one class the particles or molecules have no mutual power, or they may have repulsive or attractive power. Of the first we have examples in sand and fine powders; of the second are the elastic fluids, as air; and of the third all liquids, as water, mercury, &c. These three kinds of fluids are obviously produced by the original differences which exist in the primary particles of which they are composed.

EXTRAORDINARY CIRCUMSTANCE.—One mass of rock has been raised in Mr. King's quarry, Higher Bebbington, 40 feet long, 12 feet wide, and 3½ feet deep, making 1,680 cubic feet, or 120 tons. It is perfect, and without stain or flaw of any kind, and is now being cut up for use.—*Halifax Guardian.*

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